

A NEW BROWN-SPOT DISEASE OF THE LEAF OF GLYCINE HISPIDA MAXIM.

CAUSED BY SEPTORIA GLYCINES sp. n.

By

TAKEWO HEMMI, *Nōgakushi.*

セプトリア属一新種の寄生に因る大豆の 新病害褐紋病に就きて

農學士 逸見武雄

Glycine hispida Maxim. or soy bean is one of the most important leguminous crops in the Far East. In Hokkaidō it is most extensively cultivated, as the climate is well suited for its production. There are many destructive diseases, which attack the soy bean in our country and of which the investigations have already been done to a greater or less extent. But we have not yet heard of a destructive Septoriose on this important crop in our country. The only species of Septoria, which has been recorded as a causal fungus of a leaf-spot disease of the soy bean plant in mycological and pathological literatures, is *Septoria soja* Thüm. *)

It was in the early summer of the last year that my attention was first drawn to a diseased appearance of the leaves of this plant in the experimental plots of our college and in the adjoining fields. The microscopical examination showed at once that it was due to a kind of Septoriose. My interest was naturally aroused leading me to inquire into the extent of the damage done in other bean fields about Sapporo, and I was impressed with the fact, that the loss due to the disease

*) Von Thümen: Symbolae ad Floram mycologicam austriacam. III p. 63 (1879).

P. Saccardo: Sylloge Fungorum, Vol. III p. 509 (1884).

P. Allescher, in Rabenhorst's Kryptogamen Flora II. Aufl. Die Pilze VI. Abt. Fungi Imperfecti. s. 858. (1901).

出田新, 日本植物病理學 p. 655 (1909-1911)

G. Briosi: Rassegna crittogamica dell'anno 1911, con notizie sulle malattie dei meliloti, dei latiri, del fieno greco, del trifoglio giallo, ecc. dovute a parassiti vegetali. In Bolletino ufficiale del Ministero di Agricolt., Ind. e Comm.; an. XI., fasc. 4-6; Roma, (1912). Ref. in Zeitschrift für Pflanzenkrankheiten, XXIII. s. 201. (1913).

was not a little, for every fields were more or less affected by it.

Later in the same year, during my botanical excursions in the Province Iburi in August and in the Provinces Kitami, Tokachi and Ishikari in September, I observed and collected the diseased leaves at several places. The fungus in question was first collected in 1913 by Prof. K. Miyabe in the Province Kitami and I could examine it through his kindness. These facts show that the disease is very common and very widely distributed throughout Hokkaidō. In August of this year, Prof. S. Itō found the same fungus in the Province Echigo in Honshū. Judging from the extent to which the fungus has spread in the field, we may also safely infer, that the disease had existed there for many years without drawing our attention, and in 1914 it happened to take somewhat the character of an epidemic.

As the disease was common in the vicinity of Sapporo, I had many opportunities of studying carefully its symptoms as well as the nature of its causal fungus; and in consequence, I have been able to recognize that the fungus in question is a new species which has passed undescribed up to the present time.

Symptoms of the Disease.

The disease appears first upon both sides of the lower leaves of young plants as brown or light reddish brown spots in the early summer. Those spots are slightly raised and angular and distinct in outline, being limited by veinlets, and are scattered irregularly over the surface. The color of the spots gradually turns into dark brown and finally into blackish-brown. They are comparatively large and are most commonly 2-3 mm. in diameter, but not seldom they exceed 5 mm. The margin of the spot is not especially bordered with a deeper color as in the other type of Septoriose. The spot is more or less hypertrophied. The old spots frequently turn into grey color from the central region, the close examination of which, especially with a magnifying hand lens, reveals exceedingly small dark-colored pycnidia scattered throughout. The spots become confluent often forming large irregular brown or dark-brown patches, and the diseased leaves also turn gradually into yellow or brown color from the margin, then become dry and fall off.

The disease then works toward the top of the plant, often causing the loss of so many leaves as to result in complete ruin of the crop. The disease spreads most rapidly in a damp warm weather or in places which are incompletely drained. But in the mid summer or in a dry region, the disease does not attack the upper leaves,

although the lower leaves may have become completely wilted and defoliated.

If the surrounding conditions are favourable to the growth of the fungus in September, the disease spreads again actively. In this case, the spots are not so angular, as in those in the early summer, and are more in number and smaller in shape. In the autumn, it is difficult to distinguish this disease, as the diseased leaves are generally attacked by many saprophytic fungi. The disease may not cause a great loss of the crop; but it may interfere with the general productiveness by diminishing its assimilating surface and sometimes by causing defoliation.

Causal Fungus.

A section through the diseased spot shows the hyphae to be ramifying in the tissue of the leaf, whose chloroplastids are destroyed. The hyphae are $2-4\ \mu$ in width. The pycnidia are formed under the epidermis and immersed into the tissue at the both sides of the leaf (mostly on the upperside). They are globose or conico-globose and measure $44-100\ \mu$ (commonly $60-70\ \mu$) in diameter. The wall of the pycnidium is rather thin, membranaceous and brown or dark brown in color. It has a short round papilla which is at first covered, then erumpent with a comparatively large mouth.

The spores are filiform, straight or mostly curved irregularly, smooth, hyaline and occasionally guttulate. When the spores are stained with iodine solution, it will be clearly observed that they consist of one to three, rarely of four cells. When it is mounted in water or potash, these septa may often be overlooked. Their measurement are $21.0-52.5 \times 1.4-2.1\ \mu$. The conidiophores are very short and I could not examine them exactly. Placed in a drop of water or nutrient media, the spores swell at first, showing the septa clearly, and then germinate within 24-50 hours in the room temperature, throwing out one or two germ-tubes from each cell at or near the septa or also at the ends of the spores. The germinating hyphae are hyaline and about $2-3\ \mu$ in width. The septation and branching then take place.

From the morphological characters of the spores and pycnidia, we may easily recognize our present fungus to be a species of *Septoria*. Up to the present time, I have not yet been able to obtain its ascosporous stage. According to the description, *Septoria sojae* Thüm., which is the only species known to be parasitic on the leaves of *Glycine hispida*, is quite different from the present species in many points, especially in the measurement of the spores. The important charac-

ters of these two fungi are as follows:—

	Septoria soja Thüm.	Septoria sp.
1. Pycnidia	epiphyllous conico-globose	amphigenous globose to conico-globose
	—————	44–100 μ
2. Conidia	cylindrical to subcuneal 1 septate 12–18 \times 4.5–5.0 μ	filiform 0–3 septate 21.0–52.5 \times 1.4–2.1 μ
3. Spots	irregular in shape bordered	mostly angular unbordered

Other species of *Septoria* which are parasitic on the leaves of leguminous plants, differ from the present fungus also in the macroscopical or microscopical appearances. From the foregoing statements, I consider the present fungus to be a new species, and the following diagnosis is given.

Septoria Glycines Hemmi, sp. n.

Spots amphigenous, at first angular, brown to reddish brown, unbordered, at last dark brown or blackish brown, having greyish center, scattered or gregarious, often confluent, commonly 2–3 mm. in diameter; pycnidia amphigenous, mostly epiphyllous, scattered, globose or conico-globose, membranaceous, brown or dark brown, 44–100 μ in diameter, at first covered by epidermis, then erumpent; spores hyaline, filiform, more or less curved, or sometimes straight, smooth, guttulate, obscurely septated, 1–4 celled, 21.0–52.5 μ long, 1.4–2.1 μ broad.

Hab. On the leaves of **Glycine hispida** Maxim.

Hokkaido.—Prov. Ishikari: Sapporo (June 28; July 1; July 6; July 20; Sept. 8, 1914. T. Hemmi), Nopporo (July 4, 1910. T. Hemmi), Tsukisappu (July 19, 1914. T. Hemmi), Shimofurano (Sept. 25, 1914. T. Hemmi), Motomura (July 25, 1915. T. Hemmi).

Prov. Tokachi: Obihiro (Sept. 24, 1914. T. Hemmi).

Prov. Kitami: Nokkeushi (Sept. 22, 1914, T. Hemmi; Sept. 23, 1913. K. Miyabe).

Prov. Iburi: Kutchan (Aug. 23, 1914. T. Hemmi), Higashikutchan (Aug. 26, 1914. T. Hemmi).

Honshū.—Prov. Echigo: Uchino-Mura (Aug. 13, 1915. S. Ito).

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Phytopathological Laboratory,
College of Agriculture,
Tohoku Imperial University,
Sapporo, Japan.

摘 要

余が當農科大學試作園内大豆園の一部に一病害發生せしを發見したるは、昨大正三年六月なりしが、直ちに被害葉を檢鏡し、其原因全く *Septoria* 菌の寄生によるを認め、之れを調査せるに、未だ世に紹介せられざる病害菌たるを認め得たるにより、遂に新種と斷定し *Septoria Glycines* と命名したり。

其後予は近郊の農家に就きて被害狀況を調査せしに、何れも多少の發生を見ざるなく、其損害決して尠少にあらざるを知れり。之れより先き同一病原菌は、既に大正二年九月宮部博士によりて、北見國野付牛村に採集せられ、予も亦昨大正三年八月膽振國俱知安、東俱知安兩村に於て發病せる圃場を目撃し、同年九月北見國野付牛村、十勝國帶廣町、石狩國下富良野村等に於て採集したるに因て見れば、本道に於ける本病分布區域の廣汎なるは推して知るべし。更に本年八月同病原菌は伊藤誠哉氏によりて越後に採集せられたるを以て、廣く内地にも分布すること明らかとなれり。

本病の發生期は六七月の候にして、最初幼植物の下葉に褐色又は赤褐色の斑紋不規則に散生し、葉の兩面より認め得、病斑は漸次濃色となり、遂に黒褐色に變ず、而して葉の表面に於ては健全部より稍々膨起し、葉脈に限られて限界稍々鮮明なる不正多角形を呈すれども、特別なる周縁を有することなし。最

も老熟せる斑紋は、時を経るに従ひ、中央部稍々灰褐色となる。斯くの如くにして、斑紋多數發生する時は、漸次癒合擴大して一大病斑を作るに至る、葉は爲に周縁より黄色又は褐色に變じ萎凋して遂に枯死落下す。本病は多く下葉に止まり上葉を襲ふ事なくして止むと雖、溫暖にして濕潤なる氣候若しくは排水不完全なる所に於ては、感染すること甚だしきものにして、激裂に上葉を侵害し、遂に全植物の發育を阻止せしむ。秋期發病せるものは斑紋極めて小形にして、多數散生し其形狀も亦一樣ならざるを常とす。

本病原菌の子殻は被害葉の兩面に生ずれども、多くは表面に生じ、組織中に埋没し徑 $44-100\ \mu$ (通常 $60-70\ \mu$) あり。胞子は絲狀にして、眞直なるものあれども、多くは不規則に彎曲し、平滑にして透明、時に油球を含有するものあり。一箇乃至四箇の細胞よりなり、長さ $21.0-52.5\ \mu$ 幅 $1.4-2.1\ \mu$ なり。

本病原菌は如上の性質より明らかに *Septoria* 屬に隸屬せしむべきものなれども、既知種たる大豆の同屬寄生菌 *Septoria soja* Thüm. なるものに比較するも、其性質種々の點に於て相一致せず、就中胞子の形狀及び大きさに著るしき差違あるを認む。

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